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THE GROWTH OF THE EYE AND THE DEVELOPMENT OF MYOPIA: A STUDY IN THE CHANGES OF REFRACTION DURING THE SCHOOL PERIOD*

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THE material used for this investigation consists of the "follow up" records of the school clinic of the Tottenham Urban District Council; they therefore concern school children between the ages of five to fourteen; some of these records date back to 1915, and as all the refractions were done by one individual, the material forms an entity where the personal element is reduced to a minimum. Practically all the retinoscopies were done under hyoscine (oily solution 0.25 per cent.) Cases where the refractions were done at one time under hyoscine and at another under atropine were rejected from this series, as were also those in which the refractions did not lend themselves to analysis owing to some doubtful element in the records (irregular refractions, incomplete cycloplegia, etc.)

The selected material came to 621 cases (1,242 eyes); these fell into two groups, one containing 395 cases of hypermetropia including hypermetropic astigmatism, and the other 226 cases of myopia including myopic astigmatism, mixed astigmatism, and other cases not readily classified but containing a myopic element. Some

*This investigation was carried out under the auspices of the Jewish Health Organisation of Great Britain.

of these cases had been followed up for only one year, but others for seven, eight and even ten years.

In tracing the alterations in the refractive errors during the years they were followed up, it would have been of interest to see whether any of the changes observed were most active at some particular period of childhood. Unfortunately there were too few cases to establish the comparison of age groups which this implies. It was therefore necessary to ignore altogether the question of the age of the subject and confine oneself to the number of years he had been followed up; thus in recording a case followed up for four years the tables do not show whether these four years were between, say five and nine or ten and fourteen.

I. NORMAL DEVELOPMENT

A. The Development of the Hypermetropic Eye

An analysis of the 395 cases of hypermetropia (790 eyes) revealed a certain number that had only been followed up for one or two years, and 36 cases where the changes recorded are of irregular nature. Ignoring both these groups a series of 277 cases is obtained, which was followed up for a period varying from three to eight years. Of these 231 had been followed up for three, four or five years, and 46 for six, seven or eight years.

It is necessary to explain the system of classification adopted in tracing the modifications observed in these cases as they were followed up. Under "no change" were included all the cases that showed absolutely no change in the refraction or where the refractions were substantially the same, namely, a $\pm$ 0.5 variation. Spherical refraction offered no difficulty and astigmatic cases where both axes changed to the same extent were likewise easy. In cases of astigmatism where the two axes developed at unequal rates, any difference up to and including $\pm$ 0.5 was ignored and from 0.5 to 1 the difference was divided and added to each axis. When the difference was greater than 1D. the cases were considered as irregular. For some few cases an increase of hypermetropia is recorded; whether these are cases of genuine increase of hypermetropia or errors of observation is an interesting problem, but irrelevant to our present purpose.

An analysis of the 231 cases followed up for three to five years reveals an apparent increase of the hypermetropia in 15.5 cases; no change in 135.5 cases; and a reduction of hypermetropia in the remaining 80 cases. Of these 80 cases showing a reduction of hypermetropia, in 56 the reduction is between 0.5D.-1.0D.; a more extensive reduction occurs in the comparatively few remaining cases: in 19 the reduction ranged between 1.25D. and 2.0D.; in 45 between 2.25D. and 3.0D.; in 0.5 case the reduction was between 3.25D.-4.0D. and in none more than 4.0D. In terms of percentages the analysis can be stated as showing 65.4 per cent. no reduction of hypermetropia and 34.6 per cent. reduction to a varying degree.

A very similar result is obtained in an analysis of the 46 cases followed up for the longer period of six, seven and eight years. Here the percentages of no reduction and reduction are 60.8 and 39.2 respectively, thus differing but little from those obtained for the larger series followed up for a shorter period. The actual distribution of the cases is as follows: apparent increase of hypermetropia 4.5 cases; no change 23.5; and in the different groups of reduction of hypermetropia enumerated before the numbers are 8, 65, 25, 0 and 1 respectively.

These figures would suggest that the majority of hypermetropic children show no reduction during the school period, and in those that do, it is confined in a large proportion to a reduction that is slight in extent, as is brought about by the following summary table:—

Cases followed up for	No reduction and reduction of not more than 1.0D	Reduction between 1.0D and 2.0D	Reduction over 2.0D
3, 4 and 5 years ...	207	19	5
6, 7 and 8 years ...	36	6.5	3.5

Cases that show a substantial reduction of hypermetropia are therefore by no means common, and it is clear that the tendency towards decrease in the amount of hypermetropia does not seem to be marked during the school period.

Before leaving this subject it will be of interest to see whether the modifications observed apply equally to cases of hypermetropia of a high degree as to cases nearer the emmetropic margin.

For this purpose the cases have been divided into four arbitrary groups, according to the degree of hypermetropia present, conforming to the following definitions:—

Borderline Hypermetropia: Cases of simple hypermetropia below 1.25D., and cases of hypermetropic astigmatism where the lesser axis is below 1.25D.

Low Hypermetropia: Simple hypermetropia (or the lesser axis of hypermetropic astigmatism) ranging between 1.25 and 3.0D.

Medium Hypermetropia: Cases on a similar basis ranging between 3.25D. and 6.0D.

High Hypermetropia: Over 6.0D.

Of the 231 cases followed for three to five years 62.5 fell in the group of borderline hypermetropia, 96.5 in that of low hypermetropia, 55 in that of medium, and 17 in that of high hypermetropia. Regarding apparent increase of hypermetropia and no change as one entity (no reduction) the following summary table shows to what extent the different groups of hypermetropia vary in the relative percentages they show of no reduction and reduction.

CASES FOLLOWED UP FOR 3, 4, AND 5 YEARS.

	No reduction	Reduction of hypermetropia
Hypermetropia of less than 1.25D.	67.2%	32.8%
„ „ 1.25D. to 3.0D.	65.3%	34.7%
„ „ 3.25D. to 6.0D.	59.1%	40.9%
„ „ over 6.0D.	79.4%	20.6%

From these figures it would appear that cases up to 1D. and from 1D. to 3D. develop on parallel lines, while above 3D. the hypermetropia seems to develop differently from the foregoing, and from each other when the two subdivisions of the cases above 3D. are considered. However, in these two sub-divisions we are dealing with rather small figures; but if these two groups are added together, that is, all cases above 3D. are considered as one entity, we get 72 cases of which 46 show no reduction of hypermetropia as against 26 which do, *i.e.*, 63.9 per cent. and 36.1 per cent. respectively. These percentages agree remarkably with those for the other groups of hypermetropia, *i.e.*, below 3D., and whilst one would have liked to have had more cases of hypermetropia above 6D. (because of the suggestion in the small number under the consideration that they are relatively stationary in development), it seems safe to conclude that cases of varying degrees of hypermetropia develop at the same pace, there being no greater percentage of cases showing changes in refraction amongst the cases of low hypermetropia as compared to the cases of medium and higher degrees of hypermetropia—in fact about 66 per cent. of all cases of hypermetropia show no tangible reduction when followed up for a period of three, four and five years.

No percentages have been worked out for the 46 cases followed up for six to eight years, as the numbers in each sub-division are so small. The number of cases showing reduction of hypermetropia is rather greater in those cases that have been followed up for the longer period of six to eight years, but there is nothing in the figures to contradict the conclusions reached above. The actual figures of cases showing reduction and no reduction in this group are seen in the following summary table:—

CASES FOLLOWED UP FOR 6, 7 AND 8 YEARS.

	No reduction	Reduction of hypermetropia
Hypermetropia of less than 1.25D.	5.	4.5
„ „ 1.25D. to 3.0D.	11.5	9
„ „ 3.25D. to 6.0D.	9.5	4.5
„ „ over 6.0D.	2	—

B. The Development of the Myopic Eye

Of the 226 cases with a myopic element, 84 were followed up for only one or two years, and 12 for over five years, leaving 130 cases that were followed up for three, four or five years. The method of classifying the modifications these cases had undergone is very similar to the one used for the hypermetropic cases, and the results obtained with these three groups of cases of myopia are best considered separately.

(1) The 12 cases followed up for more than five years.

This group is too small to be considered to any extent. It is, however, interesting to note that fully 5 out of the 12 cases showed no change in the refraction. Of the remaining 7 cases 1 showed an increase of myopia less than 1.0D.; 5 an increase between 1.25D.-2.0D., and 1 an increase of over 4.0D.

(2) The cases followed up for only one and two years.

This group can be dismissed briefly—of the 84 cases 49.5 showed no change; of the remaining 34.5 cases which showed an increase in myopia, 20.5 recorded an increase of 0.75D.-1.0D.; 13 an increase of 1.25D.-2.0D., and only 1 case gave an increase of 2.25D.-3.0D.

(3) The cases followed up for three to five years.

This group of 130 cases is of considerable interest. The result of the analysis can be tabulated as follows:—

34.6%	show no change	
17.7%	show an increase	by 0.75D. – 1.0D.
23.9%	„ „	1.25D. – 2.0D.
12.3%	„ „	2.25D. – 3.0D.
3.5%	„ „	3.25D. – 4.0D.
6.5%	„ „	over 4.0D.
1.5%	„ „	that is irregular
100%		

The interesting feature of this analysis is the high proportion of cases (34.6 per cent.) that show no change when followed up for a period of from three to five years. These cases taken together with those that show but little progression (0.75 and 1.0D.) make up over 50 per cent. of all the cases, which is a distinctly lower percentage than that for the corresponding groups among the hyper-

metropes. It is an everyday experience to find the myopic eye developing to a greater and more rapid extent than the hypermetropic eye, and in this respect this table brings out nothing new. But what is worthy of note is that fully 50 per cent. of myopes do not show the steady, creeping progress that one associates mentally with every case of myopia. In hypermetropia it has been seen that the tendency is towards the refractive conditions remaining stationary rather than become greatly reduced; in myopia the tendency towards progression is decidedly more marked, but there is, nevertheless, a large class that remains stationary or develops but little.

An analysis of the cases of myopia according to the degree and type of myopia is of interest; the groups considered are:—

Low Myopia: Myopia up to 3.0D. and myopic astigmatism, where the higher axis is no more than -3.0D.

Medium Myopia: Similar cases within the range of -3.25D. to -6.0D.

High Myopia: Over -6.0D.

Mixed Astigmatism:—

Unclassified: Cases with a myopic element that do not fall in the above groups, *i.e.*, anisometropia, and cases of astigmatism in which contrary signs (*i.e.*, + and -) are present in only one eye.

Ignoring the cases followed up for only one and two years, and those few followed for more than five years, a table is obtained of which the following is a summary:—

CASES FOLLOWED UP FOR 3, 4 AND 5 YEARS.

	No change and a progression of 0.75D. - 1.0D.	Progression of 1.25D. - 2.0D.	Progression of over 2.25D.
Low myopia	12	19	19
Med. „	14	4.5	5.5
High „	5	2	—
Mixed astigmatism	19.5	4.5	2
Unclassified	17.5	1	2.5

It is not safe to draw any final conclusions from these figures as they are not extensive, but it appears that the cases of low myopia show the greatest tendency towards progression. In this connection it is of interest to note that of 7 cases of high myopia, 5 are for practical purposes stationary, and though a stationary type of high myopia in children is a recognised clinical condition, it

would be interesting to know whether a larger series would substantiate the suggestion of this small series: that among high myopes the stationary type is more common than the progressive.

II. ABNORMAL DEVELOPMENT

A. Abnormal Development of the Hypermetropic Eye

It has been seen earlier on that out of 98 cases of hypermetropia that show a reduction, 64 reveal a reduction of less than 1.25D. and that in 25.5 of the remaining 34 the reduction is between 1.25D. and 2.25D. The remaining 8½ cases (17 eyes) deserve a few remarks. Do these cases represent a special type of hypermetropia which tends to diminish more rapidly than the usual variety, or are they explicable in some other way? It will be best to consider each case separately.

Case No. 1.—The child (a boy) was first seen at the age of eight. The refraction changed within one year from R.: Emm.; L.: + 0.5D. to −1D.B.E.* At 14 the refraction was −5.25D. We are, therefore, dealing with a case of progressive myopia rather than of hypermetropia. The interest here lies in the fact that the hypermetropia did not remain stationary, as it does in most cases, but passed over to myopia. It is unfortunate that no earlier refraction than the one at eight is available. Anyhow, this large diminution is not so much a diminution of hypermetropia as an increase of myopia.

Case No. 2.—This boy of nine showed a refraction of +0.5D., cyl. axis vertical. By 13 he was myopic to the extent of −2.5D. This case is therefore similar to No. 1, except that his myopia is not so progressive.

Case No. 3.—This boy first seen at six showed a hypermetropia of about 3D. By the age of ten it had dwindled to +0.5D. Here is a case of rapidly diminishing hypermetropia, that is hypermetropic eyes behaving like myopic. It is unfortunate that his refraction a few years later is not available. Is he a potential myope, through heredity or otherwise, and is his hypermetropic reserve of no avail in saving him from myopia? Can there be a hypermetropia of the potentially myopic eye, and does this hypermetropia diminish more rapidly than the normal type?

Case No. 4.—This girl showed a refraction of +5.5D. each eye at the age of eight. Four years later the hypermetropia had dwindled to 2.5D. This case, therefore, like the preceding, shows a development more akin to myopia than to hypermetropia.

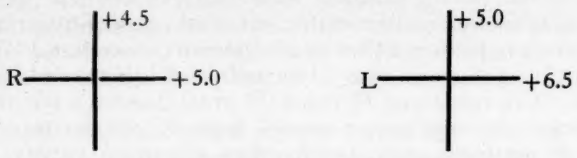
Thus, whilst cases Nos. 1 and 2 are of interest as showing cases which instead of remaining stationary pass over to myopia, and

*In stating the findings of refractions "allowance for distance" has been made.

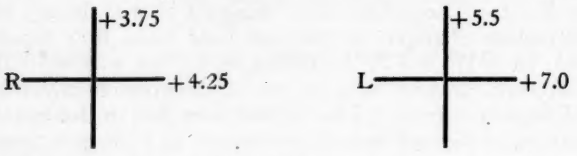
keep on progressing, Nos. 3 and 4 illustrate rather similar conditions, but the eyes are still hypermetropic, not so much because of a slighter progression, as on account of a larger hypermetropic reserve.

In the cases just considered both eyes have progressed to the same extent, but in the following the progress was mainly confined to one eye.

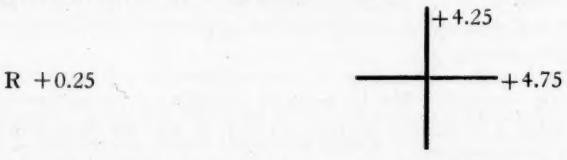
Case No. 5.—A boy first seen at five, with refraction



At 9 the refraction has changed rather unequally in the two eyes, being :—



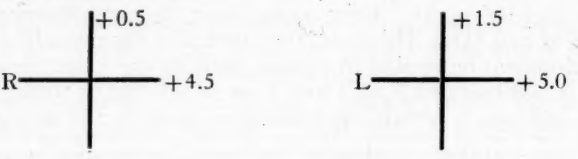
But at 13, four years later the refraction was



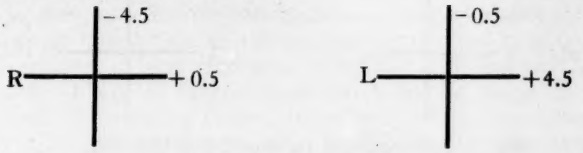
Ignoring the change in the astigmatism in the left eye, there is no dramatic variation here, but the right eye has changed greatly towards emmetropia. Here we have a case of two almost symmetrical eyes developing along different lines, one developing rapidly and towards emmetropia, and the other remaining more or less stationary and hypermetropic.

Case No. 6.—Ignoring as in No. 5 the change in the degree of astigmatism, the essential feature is the very much greater development of the right eye.

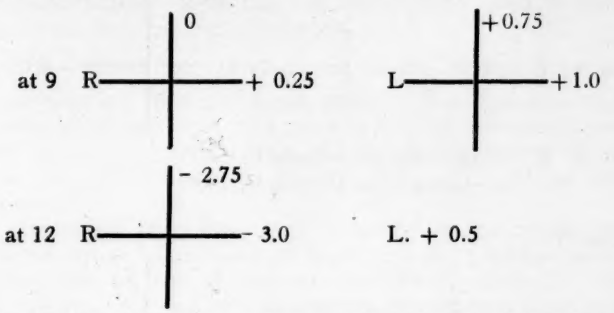
At 8 the refraction was



at 10 a reduction of 1.0D. had occurred in each eye, but at 13, the following refraction was present

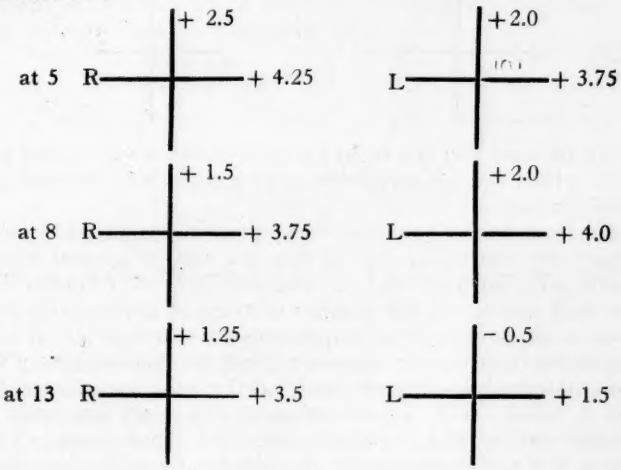


Case No. 7.—Beginning at the age of nine with almost symmetrical refractions, three years later one eye is practically unchanged, whilst the other is myopic.

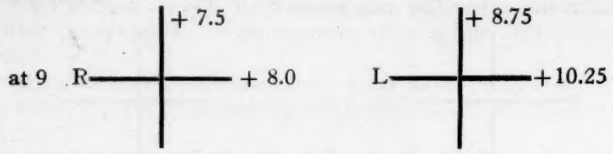


The last three cases are rather striking, but the following cases illustrate the same condition, only the discrepancy between the two eyes is not so marked.

Case No. 8.



Case No. 9.

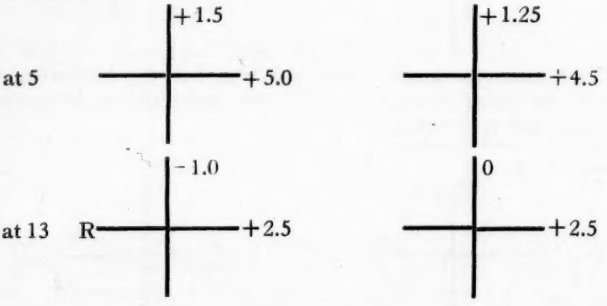


at 13 R. Hypermetropia reduced by + 0.75 D.
L. Hypermetropia reduced by + 2.5 D.

Case No. 10.

at 13 R. Hypermetropia reduced by 2.75D.
L. Hypermetropia reduced by 1.5D.

Case No. 11.



It will be seen that the right eye has passed on to mixed astigmatism, whilst the left, progressing at a slightly slower pace, has not yet done so.

There remains yet one more case where the hypermetropia has decreased by over 2.0D., but as this is a case of corneal nebulae, no useful purpose is served by giving details of the refraction here.

The very paucity of the number of cases of hypermetropia that develop to any large extent, emphasises the extent to which hypermetropia tends to remain stationary, but a consideration of these 11 cases tempts one—not so much on the evidence of cases Nos. 3 and 4, which show a diminution in hypermetopia more than most, but on the evidence of the unilateral development of cases like Nos. 5, 6 and 7—to suggest that there is a rapidly diminishing

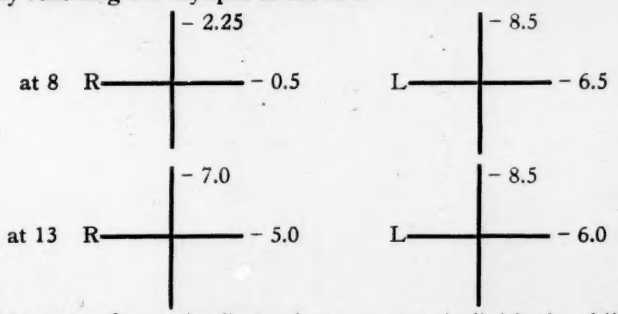
form of hypermetropia in addition to the normal slowly diminishing or stationary type, and the bearing of such a condition on myopia is obvious. Furthermore, there is the probability that this type is not so uncommon as the evidence submitted here tends to suggest, owing to the fact that a rapidly diminishing hypermetropia is likely to escape observation in the stage before it passes over to myopia, unless there be a high hypermetropic reserve. Children subject to this rapidly diminishing type of hypermetropia would in all probability be first seen as myopes, as they are the very subjects who, on account of their low hypermetropia, would escape attention in a routine school examination for visual acuity until such time as their vision became defective owing to the development of myopia.

B. Abnormal Development of the Myopic Eye

In considering abnormal development in the hypermetropic eye, the point of interest that emerged was that all hypermetropic eyes do not develop at the same pace, and that even symmetrical eyes in the same individual may develop unequally, giving rise to asymmetry.

In discussing anomalies of development in the myopic eye, it will serve no useful purpose to show a slowly and a rapidly progressing type, as both of these are well known clinically, and the cases shown here are of interest in illustrating that unequal development occurs in the myopic eye as it has been shown to occur in the hypermetropic.

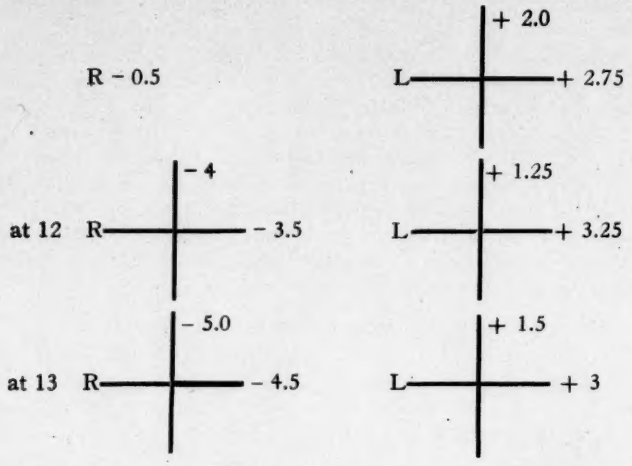
Cast No. 1.—The interest of this case lies in the fact that from the age of eight to thirteen, the left eye remained stationary, whilst the right, which was much less myopic, progressed rapidly, practically reaching the myopia of the left.



This type of case is distinctly rare—one individual exhibiting the two extremes of which myopia is capable—namely, remaining stationary and progressing rapidly.

The tendency towards unequal development is also illustrated by the three following cases of anisometropia.

Case No. 2.—At the age of eight the refraction was



Here the right eye exhibits progressive myopia, while the left is stationary, and the result is an ever increasing asymmetry. The refraction before eight would have been most instructive. Were the two eyes symmetrical at the beginning?

A similar tendency, but to a slighter extent is shown by cases 3 and 4.

Case No. 3.

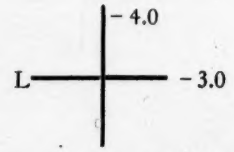
At 9 the refraction was

R. −0.75 L. Emm.

and at 12

R. −1.5 L. Emm.

Case No. 4.



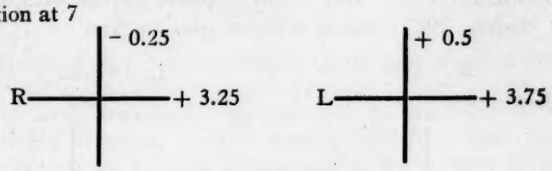
at 9 R Emm.

at 11 R. No change L. Addition of − 1.5

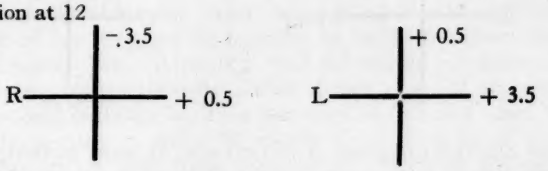
Cases Nos. 5 and 6 came from the group of unclassified cases; though they both contain a myopic element, it is not a marked feature in either. Both these cases illustrate the characteristics of unequal development; in one (No. 5), it is the eye with the myopic element which progresses, and in the other (No. 6), it is the eye with the myopic element which is stationary.

Case No. 5.

Refraction at 7



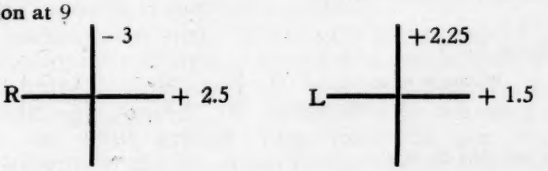
Refraction at 12



Here it is seen that the left eye is stationary, whilst the right has progressed to the extent of about - 3D.

Case No. 6.

Refraction at 9



Refraction at 13

R. No change L. + 0.5 D.

Apart from bringing out the fact of asymmetrical development taking place in myopic cases as well as in hypermetropic, these few cases when taken in conjunction with the hypermetropic cases are of interest in suggesting that anisometropia must frequently be due to this asymmetrical development, and is not, as is generally believed, a congenital asymmetry from the very first.

This suggestion is further strengthened by the following cases derived from other sources than those considered up to now.

Case No. 7.—This patient was seen by Mr. A. H. Levy in November, 1915, at the age of ten. His vision was then R. 6/6; L. 6/60.

Refraction

R. +3.0 L. - 1.0

With correction, vision was

R. 6/6 L. 6/9

Glasses ordered

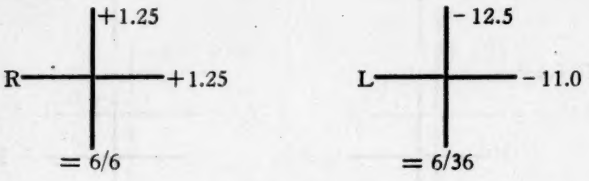
R. +2.0D. sphere L. - 2.0D. sphere

Sixteen months later vision with glasses in the right was 6/6, and in the left 6/36. But -4.0D. sphere for the left gave 6/6.

In March, 1927, vision without glasses was

R. 6/5 L. > 6/60

Refraction



The marked progress of the myopia is most striking, especially in comparison with the relatively stationary hypermetropia. It is not at all unlikely that this anisometropia had its origin in perfectly symmetrical eyes.

Cases Nos. 8, 9, 10 and 11 illustrate the same condition, but not to such a dramatic extent.

Case No. 8.

Refraction at age of 9	R. - 1.5	L. +1.5
„ 3 years later	R. - 4.5	L. +1.0

Case No. 9.

Refraction at age of 11	R. +0.5	L. - 1.0
„ 3 years later	R. No change	L. - 4.0

Case No. 10.

Refraction at age of 7	R. - 2.5	L. Emm.
„ 3 years later	R. $\frac{-5.0}{-1.0\downarrow}$	L. No change

Case No. 11.

Refraction at age of 14	R. +0.5	L. - 0.5
„ 1 year later	R. Emm.	L. - 1.25
„ 1 year later still	R. +0.25	L. - 2.5

It is, therefore, perhaps not unjustifiable to conclude that at least some cases of anisometropia have their origin in the unequal development of the two eyes. Or to put it differently: not only may there be a varying pace at which the eyes of different individuals develop, but also the two eyes in the same individual may develop at a different rate.

III. THE PROBLEM OF MYOPIA

The analysis of the hypermetropic cases has revealed the fact that on the whole the hypermetropic eye tends to remain stationary; reduction of more than 1.0D. during three to five years of school life is decidedly unusual. Still it cannot be denied that there are cases that do develop to some extent, and a few to over 2.0D.

That some development must take place is obvious by the appearance of low degrees of myopia in many children towards the end of school life. This is a well substantiated observation; in fact myopes constitute only about 10 per cent. of the visually defective among children between the ages of five and nine, whilst the percentage rises to about 25 in the case of children between ten and fourteen as was shown elsewhere (BRITISH JOURNAL OF OPHTHALMOLOGY, April, 1928). The existence of these cases therefore argues that in addition to the majority of cases where the hypermetropia is stationary there must exist a class of cases where it progresses on to myopia. The analysis has shown that this is the case, and indeed it is common experience.

But the question that arises is this: Do these cases of hypermetropia passing over to myopia represent a normal growth, *i.e.*, is the myopia the physiological result of a congenital absence of a high hypermetropic reserve? If the question be answered in the affirmative one must explain why about 66 per cent. of borderline hypermetropia, *i.e.*, hypermetropia below 1.25D. remain stationary, and do not become myopes. Admitting that we are dealing with a limited period of the child's life, and that we have in these statistics no evidence at all of what happens after the age of fourteen, it must still be recognised that the comparative value of these two groups remains. It remains a fact that for the period discussed here about 66 per cent. remain stationary, and the remainder progress—and that of this remainder some cases progress very rapidly indeed, as the consideration in the section on the abnormal development of the hypermetropic eye has shown (particularly in the case of development of one eye). Still it is also true that of the hypermetropic cases that do show development there are but few that show it extensively. But it must not be forgotten that the series considered here is composed of selected cases, cases that have found it necessary to maintain attendance; if a low hypermetrope have an extensive reduction of his hypermetropia he becomes a myope and thus remains under observation, and any further progress is regarded as the progression of the myopia; but if a medium or a high hypermetrope has his hypermetropia reduced extensively, he finds he can see better and quite comfortably without his glasses and simply discards these, and is no

longer seen in the treatment centre. It is, therefore, not surprising that in a "follow up series" there should be comparatively little direct evidence of a rapidly diminishing hypermetropia and that most of the evidence submitted here should come from the relatively few cases of development of this type confined to one eye, as these cases still find it necessary to maintain attendance.

One would have liked to have the more direct evidence, such as would be given by a large series of unselected cases followed up for many years, but it would seem warranted on the evidence considered to conclude that:

(1) The vast majority of hypermetropic cases are absolutely stationary—or almost so—during the school period.

(2) A certain proportion show some reduction say up to 1.5D.

(3) A much smaller proportion show a more marked reduction, even over 4D.

When the cases of myopia are analysed it is found that progression is the characteristic of about 66 per cent., *i.e.*, the position is reversed in comparison to hypermetropia. As myopic cases are more subject to supervision, they lend themselves much more to an accurate analysis, and it is not necessary to stress what is well known. Thus it is well established that:

(1) Some cases are stationary.

(2) Many progress slowly and constantly.

(3) Some few progress very rapidly (progressive myopia).

But what the analysis has brought out is the fact that the proportion of cases that are stationary during the school period, is quite considerable (about 33 per cent.) and furthermore that about 15 per cent. progress very slowly indeed (0.5D.-1.0D.)

Again making allowance for the limited period with which these figures deal, their comparative value must also be stressed. It is also worth recalling that the greatest tendency towards progression is exhibited by the cases of low myopia.

What has been said so far, may briefly be summarised thus:—(1) that there is a progressive type of hypermetropia as well as of myopia, and (2) that there is also a stationary type of myopia as well as of hypermetropia. (It is, of course, unnecessary to point out that while progression implies the same process in both myopia and hypermetropia, it results in a decrease in the error of refraction in the case of hypermetropia, but an increase in the case of myopia).

The conclusions to which one is tempted by these observations are:

(1) That the normal tendency shown by the hypermetropic eye during school period is to remain stationary.

(2) If any noticeable reduction takes place this must be regarded as abnormal.

(3) It is this abnormality manifested by the hypermetropic eye which is the root cause of myopia.

(4) If this abnormality—undue development of the eye—is at all marked, myopia must supervene unless there be a high hypermetropic reserve.

(5) This abnormality may be of a feeble extent or quite strongly marked (just as there are mild and severe forms of other abnormal processes).

(6) It affects the hypermetropic and myopic eye equally, but it is most obvious in eyes that have become myopic owing to this affection.

(7) This process may become arrested at any stage and any period: hence the stationary type of myopia.

(8) Or it may continue unchecked for a considerable time (progressive myopia) even through adult life (malignant myopia).

(9) The greater frequency of the progressive type in low degrees of myopia is explained by the fact that low myopia is an early manifestation of this affection; whilst the increase of the stationary type in the medium and high degrees finds its explanation in the fact that the process is subsiding after running its course.

(10) Or to be put otherwise: this tendency is a disorder, which may affect any eye, irrespective of its being hypermetropic, emmetropic or myopic; its intensity is variable and its course is evolutionary, ending in subsidence, sometimes early in childhood (as these statistics show) usually at some period during adolescence (as is the common experience), more rarely not until late life (of which type most oculists have experience).

(11) This process is *not* myopia: indeed, myopia only stands in casual connection with it; it is most commonly seen in myopia as this is one of its results.

(12) A myopic eye elongates not because it is myopic, but because it is subject to this affection. Myopia *per se* is no more the cause of the progressive elongation of the globe, than a glaucomatous cup is the cause of increasing tension.

Apart from the evidence considered here in favour of this view the following clinical observations may be mentioned.

(1) Cases do occur in which "typical myopic crescents" are present in eyes with low hypermetropia and in eyes with very low myopia. These cases must be regarded—if the crescents are really due to stretching—to a rapid reduction of the hypermetropia from a high degree to a low, or to low myopia, *i.e.*, as manifestations of this affection in the hypermetropic eye.

(2) Very extensive myopic changes are sometimes found in relatively low degrees of myopia: these eyes were in all probability originally cases of high hypermetropia and their low myopia therefore represents a stretching of a considerable degree.

(3) There are also the somewhat rare cases of high myopia with but little degeneration. These may be either purely congenital errors (and they are generally believed to be such) or they may represent cases where the greater part of the high degree of the myopia is not due to this process which induces stretching, with its concomitant degeneration.

As an illustration of the onset of this alleged disorder in eyes that had been developing normally (*i.e.*, remaining practically stationary) for a period of years and then began to show rapid development (*i.e.*, behaving like myopic eyes) the following case can be given.

A girl, aged five, showed the following refraction

R. +4.5D. L. +4.0D.

At eleven the refraction had changed to

R. +3.0D. L. +3.5D.

but at thirteen both eyes showed a refraction +1.5D.

Thus for the whole of the first six years the mean reduction for each eye was 1.0D., as against a reduction of 1.75D. for a period of no more than two years later on. This later reduction is much more like the progression seen in myopia, and in fact should this tendency to a reduction of about 1D. per year persist till about 18, the child will become a myope of about -3.5D.

A somewhat similar condition is seen in the right eye in case No. 5, and in the left eye in case No. 8 of the hypermetropic series.

An attempt to define the nature of this affection which causes elongation of the eye opens an extensive problem, the discussion of which is not within the scope of this paper. But as a passing suggestion it is worth recalling that vitreous changes are a frequent association of myopia—and it may very well be that the relationship is more than casual, that stretching of the sclerotic is induced through its being relaxed or perhaps softened through a chronic inflammatory condition of the eye (manifested by the vitreous changes).*

Perhaps it is not superfluous to add that this article is offered not so much as a serious contribution to the problem of myopia, as a plea for the more intensive study of the changes undergone by the eye during the period of growth. It is only through an understanding of the physiological changes undergone by the eye, that one can hope to appreciate that abnormal development which results in myopia.

* Since this paper has been written there has appeared the Annual Report for 1927 of the School Medical Officer of the London County Council, where there is a record of the work of Dr. Elizabeth M. McVail, who found that children subject to progressive myopia show a definitely heavier incidence of infected tonsils than the normal school population. (*V.* p. 664 of this number.)

Summary

I. When traced for a period of three to five years, about 65 per cent. of hypermetropes showed no reduction of their hypermetropia. Of the remaining cases, a reduction of more than 1.0D. was seen in only a few.

II. Rather similar proportions were obtained for the smaller number of cases followed up for six to eight years, as far as the percentage of cases showing no reduction is concerned; for those cases that do show reduction, the tendency is for the reduction to be rather heavier.

III. These considerations, in all probability, apply equally to all degrees of hypermetropia, whether near the emmetropic margin or over 6.0D.

IV. About 35 per cent. of cases of myopia appear to be stationary when followed up for between three to five years; and about 15 per cent. show an increase of not more than 1.0D.; it is only in the remaining 50 per cent. that the progression is seen that one associates with all myopes.

V. Unlike the conditions seen among hypermetropes, the different degrees of myopia appear to behave in a different manner. Thus low myopia seems to tend more towards progression than medium and high myopia, and mixed astigmatism.

VI. A consideration of cases of abnormal development reveals that some cases of hypermetropia developed more on the lines of the rapid progression seen in myopia than on the relatively stationary condition or slow progression usually obtained in hypermetropia. Much of the evidence brought forward is concerned with the unequal development seen in the two eyes of an individual.

VII. Similar unequal development is shown to exist among myopes.

VIII. It is concluded that not only may there be a varying rate at which the eyes of different individuals develop, but also that the two eyes in the same individual may develop at a different rate, and incidentally the congenital nature of most cases of anisometropia is questioned.

IX. Mainly in view of the fact that there are:

(1) Some cases of hypermetropia changing as rapidly as myopia.

(2) Some cases of myopia remaining as stationary as hypermetropia, and

(3) Symmetrical eyes progressing unequally,

it is argued that the refractive condition of an eye has nothing to do with the tendency to progression. This tendency is regarded as an abnormal state supervening as readily in the hypermetropic as in the myopic eye, and may affect one eye only. That this tendency should be most often seen in myopia is only to be

expected, as it induces a myopia where this has not existed before. Myopia is the result, not the cause of the progression.

X. Cases are quoted to illustrate how hypermetropia that has been stationary for years suddenly diminishes, without going on to myopia, because of the presence of a sufficient hypermetropic reserve.

XI. Of the behaviour of this disorder which induces elongation of the globe, it is pointed out that it has an evolutionary course, beginning at some period of childhood, and persisting through adolescence (progressive myopia), though it may become arrested at an earlier age (stationary myopia in children), or go on through adult life (malignant myopia). (The usual age for the onset of this disorder is probably somewhere about twelve to fourteen years).

XII. A passing suggestion as to the nature of this disorder is made.

XIII. During the school period the growth of the eye has but little effect on its refractive condition.

In conclusion, I wish to express my indebtedness to Mr. T. W. Letchworth. Apart from making this work possible through his permission to use the material discussed in this paper, he has helped the writer to get a clear perception of many of the ideas expressed, of which not a few represent what he has been teaching for some years.

To Mr. A. H. Levy I am obliged for permission to use case No. 7, in the series of myopic cases; and it is a pleasure to acknowledge appreciation of his ready help and sympathetic criticism.

ASEPTIC SEROUS MENINGITIS FOLLOWING INTRA-OCULAR FOREIGN BODY

BY

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I BELIEVE the case described below to be of a very rare type, and worthy of report.

E.W.H.N., male, aged 17 years, was admitted to this hospital on September 25, 1928, having been sent here from the Royal Free Hospital. At 11 a.m. on the morning of admission he had been struck in the right eye and face by some steel splinters while at work; no previous eye trouble was reported.

There was a skin abrasion of the right cheek. The right eye was slightly injected and watering; examination revealed a perforating

wound of the cornea at 8 o'clock, with a large hole in the iris in a corresponding position, the ragged margins of which were all directed forwards, having presumably been swept that way by a gush of vitreous into the anterior chamber. The anterior chamber was of normal depth and contained vitreous; the pupil was atropised and the lens clear. The ophthalmoscope revealed a foreign body in the bottom of the vitreous with some extravasated blood; the optic disc and upper fundus were normal. Tension was normal and vision 6/5 unaided.

The left eye was normal in all respects, with 6/5 vision.

A steel foreign body was removed at once from the right eye with the aid of the Haab and small hand magnets, through a keratome incision.

September 26, 1928. Appearances were satisfactory. The cornea was bright, with many folds in Descemet's membrane. Vitreous floaters were present in large numbers. General condition satisfactory. The patient vomited a little food once in the afternoon.

September 27, 1928. The lids were swollen and oedematous, cornea hazy, and conjunctiva chemotic. The globe was immobile, and the appearance was one of an orbital infection. Evisceration was decided upon. Before this was done the patient was found at 3.0 p.m. to be definitely drowsy and complained of headache. Head retraction was present, and Kernig's sign positive R. and L.

The globe was eviscerated that evening; pus was present in the vitreous. A rubber drain was inserted far back into the orbital cavity; no pus was found in the orbit nor did any drain from here at any subsequent time. Lumbar puncture was performed, and the cerebro-spinal fluid was found to be under considerable pressure; 25 c.c. of clear colourless fluid were withdrawn before the pressure was normal. A culture of the aqueous revealed the presence of S. albus only; examination of the cerebro-spinal fluid showed no excess of cellular elements, nor was any micro-organism revealed on examination of culture.

No special treatment was followed beyond the exhibition of calomel, attention to a very dirty mouth, and the application of hot fomentations every two hours to the region of the right eye.

September 28, 1928. General condition was a little improved, and the patient stated that he felt better, The temperature, which yesterday had reached 101.6°, was 100.4°. There was much swelling and chemosis present.

September 29, 1928. The patient complained of much pain in the socket, and of feeling very drowsy. Pulse 48, temp. 101.4°; the right side of the face was oedematous. There was marked weakness of the left grip, and the left arm reflexes were exaggerated. Abdominal reflexes exaggerated and equal; knee jerks weak and equal, ankle

jerks moderate and equal. Extensor plantar response right and left. Head retraction persisted.

Lumbar puncture was again performed, and the withdrawal of about 1 drachm sufficed to reduce the pressure to normal.

September 30, 1928. Temperature had fallen to normal, pulse was 52. The patient was less drowsy; the oedema of the face had subsided, and the swelling of the socket was less.

October 1, 1928. General condition was improved. Temperature normal, pulse 52. The grips were equal in strength, and a bilateral flexor response was present. Intense chemosis still caused prolapse of conjunctiva between the lids.

From the last date there has been a gradual and steady improvement; on the 7th the conjunctiva was able to be replaced and the lids were strapped over it; there is now—October 16, 1928—very little chemosis. On the 11th the patient was allowed to get up and complained of no headache as a result; he now feels perfectly well.

The clinical picture was undoubtedly one of meningitis, and the condition must be considered to have been one of aseptic serous meningeal effusion. Comparable, in a sense, are the pleural effusion which may occur in conjunction with a liver abscess, and the ascites with intestinal new growth.

I am indebted to Miss I. C. Mann for permission to publish this case.

UNUSUAL CASE OF MACULAR DEGENERATION

BY

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A.M., widow, aged 46 years, was admitted to this hospital on August 21, 1928. She complained that, although vision had been good in both eyes without glasses up to six years ago, and with glasses until two years ago, since that time there had been a gradual deterioration in both eyes. No other symptoms were complained of except a very ill-defined and mild ache in the region of the right eye for the last year. She was wearing $\frac{+ 3.0 \text{ D.Sph.}}{+ 0.5 \text{ D.Cyl.} - 180^\circ}$ R. and L.

On admission, the eyes were normal externally, the pupils active, and the tension normal. The right optic disc was normal; in the region of the macula there was vaguely defined a circle, of diameter about 1.5 times that of the disc; the circle could with difficulty be

seen in its entirety, and had a pale greyish tinge in comparison with the normal retina. The upper part of the area thus demarcated was definitely depressed, the very fine vessels crossing the edge being seen to dip down into the area. The lower part was well defined in its periphery, being of a markedly lighter colour than the rest, and closely resembling in appearance a colourless or yellowish subhyaloid exudate. That this appearance was indeed due to the presence of a fluid occupying the lower segment was proved by causing the patient to lie for two hours on her right side, when the lighter area was found to have altered its position and to be then lying in the temporal segment. No other fundus abnormality was found.

At the left macula was found a small irregular dark grey area, presumably pigment, resembling the more usual types of pigmentary macular degeneration.

Vision on admission was: R.E. (with glasses) 6/60. L.E. (with glasses) 6/24 (pt.). Both visual fields were full; the right blind spot was normal, the left could not be elicited. There was no central scotoma in either eye; on the Bjerrum screen, the 10 mm. white fixation disc, when seen by the right eye, was described as of irregular shape, as large as a crown, with an irregular black centre, from which black "spokes" radiated to the periphery in all directions. The left eye saw it as a similarly irregular area, the size of a shilling or a little larger, the "spokes" being present but less marked.

Colour vision was normal. The urine was acid in reaction and contained no sugar nor albumen. The Wassermann test was positive.

Treatment consisted in atropine drops, hot box to the right eye twice a day, and hot air baths on alternate days; the internal administration of potassium iodide, and the daily inunction of 1 drachm of oleate of mercury. In addition, 5 intravenous doses of N.A.B. have so far been given. Apical infection of the lower incisors was found to be present, and these teeth were extracted.

October 1, 1928. There is no change observable in the condition on ophthalmoscopic examination. Vision is now: R.E. (with glass) 3/36. L.E. (with glass) 6/24 (all). According to the patient (who is of a very neurotic disposition and whose answers in this respect are probably unreliable) there is considerable variation in visual acuity from day to day.

The condition would appear to be one of persistent decolourised subhyaloid haemorrhage in the region of the right macula, with pigmentary degeneration of the left macula.

I am indebted to Mr. Maurice H. Whiting, for his permission to report this case.

ANNOTATIONS

Myopia and School Work

The notice of the report of the Medical Officer of the London County Council (p. 664) upon the work of his department in the schools is of interest, mainly because of the observations made upon the children who are admitted to the "Myope Classes." It will be remembered that these children suffer from high degrees of myopia; nothing under five or six dioptres is deemed fit for admission. This may have some bearing upon the observations that there is amongst them on admission a higher average of under nourishment than with normal school children. How can a child that cannot see with ease get the exercise and therewith the robustness of the normal? It has been established that the appearance of under nourishment is not always due to lack of food. This is a point that might well be determined with regard to these children.

But the abstract is of interest because it illustrates well the work that is being done by the school medical officers throughout the country. Too often we are inclined to look upon this work as "routine" and therefore devoid of interest. But to the open-eyed school doctor there are always points of exceptional interest arising which require investigation. The reports of the chief school doctor of the several education committees throughout the country abound in reports of investigations that have been made during the year. A list of these investigations is given in the Annual Report of the Chief Medical Officer of the Board of Education. Some of these investigations deal with eye matters. It would be of interest if our readers followed the example of Dr. Sourasky and sent the Editor of this Journal notes upon any observations of interest that appear in the reports of their local authorities.

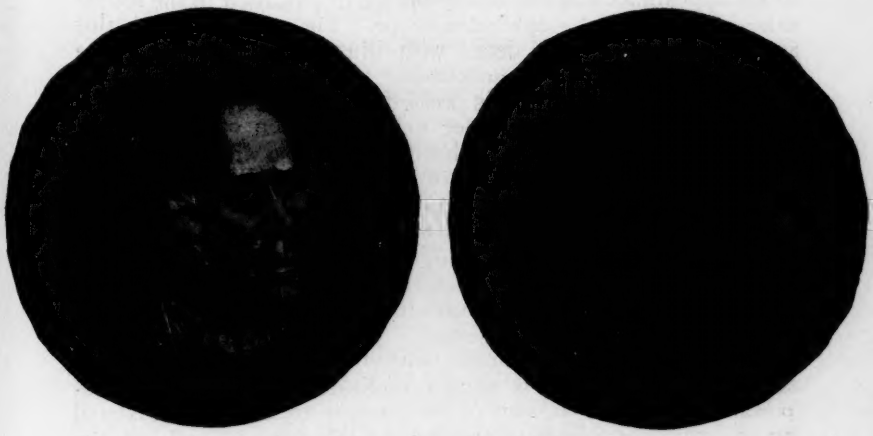
William Mackenzie Medal

Ophthalmologists recently paid honour to the memory of one of the fathers of British Ophthalmology by establishing a William Mackenzie Memorial Fund, one of the purposes of which is the recognition and encouragement of original work in our speciality.

William Mackenzie was a Glasgow man and his professional life was spent in that city. The memorial fund will be in the hands of

the governing body of the Glasgow Eye Infirmary. The committee, appointed periodically to deal with the expenditure of the income of the fund, and with the award of the Mackenzie Medal, contains representatives of the Eye Infirmary, The Royal Faculty of Physicians and Surgeons, and the University of Glasgow, with all of which institutions William Mackenzie was associated during his life-time.

It is perhaps fitting that the first award of the William Mackenzie Medal should have been made to Dr. A. Maitland Ramsay, formerly of Glasgow, one of Mackenzie's successors on the



THE WILLIAM MACKENZIE MEDAL.

staff of the Glasgow Eye Infirmary, and the lectureship on "Diseases of the Eye" at the University.

At a meeting held at the Eye Infirmary on the evening of October 9, Dr. Ramsay received the Medal from the hands of Mr. James Gilchrist as representing the custodians of the Memorial Fund. After expressing his appreciation of the honour which had been conferred on him and having paid tribute to Mackenzie and his services to ophthalmology, Dr. Ramsay spoke on the "Importance of General Methods in the Treatment of Eye Diseases." The theme was well suited to the speaker, who has in an eminent degree made it the guiding principle of his practice and an important part of his clinical teaching.

A vote of thanks was accorded to the lecturer on the motion of Sir Donald MacAlister, Principal of Glasgow University.

ABSTRACTS

I.—ANATOMY AND PHYSIOLOGY

(1) **Bailliart, P.—The retinal arterial pressure. (La pression artérielle rétinienne.)** *Ann. d'Ocul.*, Vol. CLXV, p. 322, 1928.

(1) **Bailliart** reviews the situation in regard to retinal arterial pressure ten years after his first publication on the subject, and in the light of the results obtained by his technique. The ophthalmodynamometer is made in two forms, one having a circular graduated dial and two pointers which can be fixed at the points of the appearance and the disappearance of pulsation in the retinal artery as seen by the ophthalmoscope. The technique with this instrument is given in detail with illustrations explaining the matter clearly. A local anaesthetic is only necessary for the beginner. The instrument is pressed against the eyeball near the outer canthus, a little posterior to the insertion of the external rectus, while the observer watches the optic disc with his ophthalmoscope. Practice is essential in learning the technique.

Bailliart refers to the method of Bliedung in which a hollow cylinder is placed in front of the eye. One end of the cylinder is fitted with a glass window through which the retina is examined ophthalmoscopically. The cylindrical chamber is connected with a manometer so that the pressure within, which is capable of being raised, can be noted by an assistant. The other end of the cylinder closes the chamber by contact with the skin. Bailliart points out that the apparatus is more complicated than others, is less portable, and also that some of the pressure applied and registered by the manometer is dissipated by thrusting the eyeball into the orbit and by compression of the coats of the eyeball. Bliedung's investigations give readings for the retinal arterial pressure at 15 years of age 96-64 mm. mercury, and at 68 years of age 117-75 mm. mercury. Bailliart also refers at length to Duke-Elder's method of measuring the arterial pressure experimentally in the cat by the introduction of a micro-pipette into the lumen of the blood vessels, and to the results obtained, namely, systolic pressure 86, diastolic 65. As in the measurement of brachial arterial blood pressure by the method of Riva-Rocci or its modifications, the readings obtained are not absolute. The conditions vary with different individuals. So with measurements of retinal arterial pressure by Bailliart's method the readings are relative, but they are none the less of value. The beginner always tends to obtain readings which are too high owing to hesitancy and delay in the technique. Bailliart reads the pressure at the first real pulsation of the retinal artery as the diastolic B.P., and does not wait for the largest pulsation as advocated by some. It is considered that the readings

obtained are probably slightly above the true arterial pressure and hence the earlier readings taken as described above may approximate closely to the truth. The systolic pressure is better read, not when the pulsation in the artery is seen to cease, but at the moment at which it re-appears on reducing the pressure of the eye. The diastolic pressure is of greater clinical importance than the systolic. This is from 30 to 35 mm. mercury to a systolic pressure of 70 mm. in the normal human eye. Referring again to Duke-Elder's experimental work on the cat, Bailliart states that he and Magitot found the retinal arterial B.P. higher than in the human (45-110, and 45-70), and that the general B.P. in the cat was higher than in man (160-140). Duke-Elder's average for the cat gives diastolic 64, systolic 88.5.

Bailliart in referring again to the relative nature of the readings obtained, points out that the choroid is probably of more importance than the sclerotic as a cause of variation. In the majority of people the effect of the sclerotic on the readings of the instrument is approximately equal. In elderly persons and those with hypertension the choroid on the other hand probably gives greater resistance than in younger persons and so exaggerates the readings. The use of the instrument itself reduces the ocular tension in young persons and hardly has any effect on the tension in the elderly. In the latter, therefore, the dynamometer pressure is transmitted almost unaltered to the vitreous, whereas in the young there is a certain loss of pressure dissipated by the choroid. Full consideration is given to the indication of the moment at which the reading should be taken on the instrument for diastolic retinal arterial pressure. Bailliart upholds the contention that the indication is the appearance of the first real arterial pulsation and not that of the largest pulsation. This is not in agreement with the indication observed by the physician in taking the general arterial diastolic pressure, but is considered the easier to observe and the more accurate in result. The indication of the systolic pressure is the re-appearance of the arterial pulsation on reducing the pressure of the instrument rather than the actual point of disappearance. It is impossible to retain accuracy in trying to read the highest retinal systolic pressures. The employment of pressure by the dynamometer of much over 120 grms. on the patient's eyeball is painful and hinders observation. The most useful information is the reading of the diastolic pressure.

Bailliart quotes readings of other workers who had employed his method with similar results and reiterates that the normal human retinal arterial pressure is 30 to 35 mm. mercury for the diastolic and about 70 for the systolic. He continues with some remarks to explain the difference of these figures from those of Duke-Elder: (1) It is unwise to deduce from animals to man.

(2) Magitot and Bailliart found by the latter's method a higher retinal arterial pressure in the cat (45-110 and 45-70) and Bailliart compares the *mean* of these (45-90) with Duke-Elder's figures (64-88.5) He does not consider the fact, therefore, that the cat's retinal arterial pressure being higher than man's accounts entirely for the difference. (3) There are experimental errors: *eg.*, the column of blood in a pipette is unable to distend the tube and will tend to give an exaggerated reading; mercury, as stated by Marey, is not an ideal medium for use in a manometer—it distorts the oscillations produced by the blood and its use possibly accounts for the smaller difference between the systolic and diastolic pressures obtained by Duke-Elder.

In a case of aortic regurgitation the brachial diastolic pressure often measures 50 mm. mercury, and a retinal arterial pulsation is often found. The tonometer gives a measure of the ocular tension accurate to within a few mm., namely, 20-25. In the case of arterial retinal pulsation this represents approximately the diastolic pressure which is therefore half the brachial pressure as contended by Bailliart. Cases of glaucoma with retinal arterial pulsation and with tonometer readings of 40-50 mm. mercury indicate the level of the retinal diastolic pressure to be below the figures of Duke-Elder, and that in patients in whom frequently the general blood pressure is raised above normal. In these cases again the retinal arterial pressure may be shown to be half that of the arterial pressure in the arm. It is important to register the brachial arterial pressure whenever the retinal pressure is estimated. In most cases where one is raised the other is also, and without any other ocular signs. Occasionally the retinal pressure is raised, although the general pressure is normal. Sometimes remarkable variations are found in the retinal pressure at short intervals in certain forms of increased intra-cranial pressure. In certain emotional states and in epileptics similar oscillations of the retinal pressure are found. In cases of doubtful papilloedema (*stase papillaire*) evidence in support of this diagnosis is a raised retinal blood pressure, whereas a normal pressure does *not* exclude it. In optic atrophy a moderate rise of retinal arterial pressure is not uncommonly found with very diverse causes, and is not to be regarded as of consequence. In atrophic cupping (non-glaucomatous) the retinal diastolic and systolic pressure is usually low, while the general blood-pressure is slightly raised, indicating a partial obstruction of the central artery. All that has been said refers to the rise or fall of the retinal arterial pressure relative to the general pressure. A raised pressure is present when the retinal diastolic pressure is definitely more than half the brachial diastolic pressure.

HUMPHREY NEAME.

(2) **Serr, Hermann (Heidelberg.)—On the blood pressure in the intraocular vessels. (Über den Blutdruck in der intraocularen Gefässen.** *Arch. f. Ophthal.*, Vol. CXIX, Pt. i, 1927.

(2) **Serr** briefly states and criticises the main facts on the pressure within the intraocular vessels in the light of his own researches on this subject, on which no general agreement has yet been attained. In the retinal veins the pressure at their exit on the optic disc is only very little greater than the normal intraocular pressure, *i.e.*, at most 1-2 mm. Hg higher than 20-25 mm. Hg. In the capillaries (in which the pressure is measured by the degree of compression just sufficient to retard the blood stream through them) the pressure is only slightly higher than the intraocular, *viz.*, about 30 mm. Hg. As regards the arteries, the retinal arteries at their point of entry on the optic disc have been studied. Results here have varied because the condition of the vessels during diastole, which writers have chosen as a measure of the compression force required, has not been the same. The only correct standard for the diastolic blood pressure is the *first* temporary emptying of the vessel, not a *permanent* intermittent flow, which the compression force produces.

To measure the systolic blood pressure one must raise the compression force rapidly and take the lowest reading that produces a collapse of the artery, temporary but lasting over several pulse beats; some writers, on the other hand, have raised the compression force slowly and thereby given time for the blood pressure to rise through obstruction to the flow before taking their readings, which are accordingly higher.

Serr is of opinion that for the diastolic pressure 30-35 mm. Hg, and for the systolic 55-70 mm. Hg is the most correct calculation.

Among the questions arising from a knowledge of the blood pressure in the intraocular vessels he mentions the renewal of the aqueous fluid, which he regards as a secretion rather than a filtration.

THOS. SNOWBALL.

(3) **Samojloff, A. J. (Moscow).—On the measurement of the blood pressure in the ocular vessels by means of the pressure-pad method. (Zur Blutdruckmessung in den Augengefässen mittels der Pelottenmethode.)** *Arch. f. Ophthal.*, Vol. CXIX, Pt. i, 1927.

(3) **Samojloff** employed Seidel's pressure pad in a study of the pressure in the extraocular vessels, as a method of obtaining indirectly data (regarding the intraocular blood pressure and the problems on which a knowledge of this pressure depends) more reliable than any attempt to measure it directly would yield. With this method he took readings on the anterior ciliary vessels in a series of normal human eyes and determined the limits within

which the intraocular blood pressure must lie, *viz.*, for the diastolic pressure in the artery between 34 and 46 mm. Hg, for the systolic 50 to 65 mm. Hg, the venous pressure varying from 9 to 13 mm Hg.

THOS. SNOWBALL.

II.—SYPHILIS

(1) **Cazalis (Béziers).—Syphilitic chancre of the conjunctiva in a boy aged seven years. (Chancre syphilitique de la conjonctive chez un enfant de sept ans.)** *Ann. d'Ocul.*, Vol. CLXIII, p. 822, 1926.

(1) **Cazalis** in reporting briefly his case of primary chancre affecting the right caruncle, semilunar fold and lower conjunctival fornix, enumerates four other reported cases of conjunctival chancre in the literature of 1925. The report is illustrated with photographs, and especial emphasis is laid on the tendency for faulty diagnosis of this condition, particularly when it occurs in children or adolescents.

HUMPHREY NEAME.

(2) **Behr, Carl (Hamburg).—On meta-syphilis of the eye. (Über Metalues des Auges.)** *Zeitschr. f. Augenheilk.*, Bd. LX, S. 319, 1926.

(2) **Behr** has written a comprehensive article which treats particularly of the manifestations of syphilis in the optic nerve. Spirochaetes, he finds, are demonstrable in the visual pathway in one-third of the cases of syphilis when changes of an inflammatory or degenerative character are present. They remain confined to the mesodermal elements in the nerve, and it appears that their action in optic atrophy, contrary to what happens in cases of general paralysis, is not primarily directly upon the nerve tissue with which they never come into actual contact. The optic nerve loses its system of trabeculae just anterior to the chiasma, and the tabetic process can start at any point peripheral to this. The spirochaetes lodge in the connective tissue net-work and the thick pial sheath of the nerve, and the endo-toxins they produce first give rise to changes in the septa, and subsequently to disease and functional disturbances in the glial fibres. The lymph which nourishes the nerve is carried from the blood vessels in the connective tissue septa along the glial fibres, and with the involvement of these, the vitality of the nerve fibrils is diminished until they are destroyed.

In cases where the organisms are lodged in the connective tissue septa in large numbers, specific treatment, by destroying them, sets free large quantities of endotoxin; and this may be enough to destroy completely the nervous parenchyma, which is already partially disabled by the morbid process. Active therapeutic measures are therefore not to be indulged in lightly. In 100 cases, Behr has tried the effect of treatment by arsenic, mercury, bismuth, protein therapy, and malarial intoxication, and in no one has he found any evidence of permanent improvement. On the whole it is useless, and, when pushed, any of the above methods of therapy may result in the complete destruction of vision which before may have been to some degree useful.

W. S. DUKE-ELDER.

(3) **Vancea, P. (Cluj, Rumania).—Syphilitic tarsitis of polypoid type. (La tarsite syphilitique végétante.)** *Arch. d'Ophtal.*, October, 1927.

(3) Tarsitis is one of the rarest of the manifestations of syphilis. Three clinical types are usually described (see Le Roux, *Brit. Jl. of Ophthal.*, November, 1927, p. 576).

Vancea publishes notes of a case under his care, which does not fall into any one of the three groups, and which he thinks justifies the addition of another variety to those already described. His patient, a female, aged 52, came under observation on July 9, 1926, with symptoms (lacrimation and photophobia) of about six weeks' duration. Two weeks before her attendance at the clinic she noticed in the left eye a growth the size of a "grain of wheat" which rapidly grew to the size of a "small nut." On admission the left upper eyelid was much thickened, covering half the cornea; the skin of the lid was inflamed and red with enlarged superficial veins. At the edge of the tarsus was a growth "the size of a nut" situated almost centrally and reaching from the ciliary border nearly to the superior cul-de-sac. The tumour had a rose colour and an irregular mushroom shape; it was almost cartilaginous in consistence and limited to the superior tarsus which was so thickened that it was everted with much difficulty. The remainder of the conjunctiva was congested and secreting mucus. The praeaural gland was enlarged. A Wassermann blood test was strongly positive. On antisyphilitic treatment the growth and swelling disappeared in less than a month. No history of infection could be obtained.

The author states that only about 25 examples of syphilitic tarsitis can be found in the literature of syphilitic eye affections and no previous case with polypoid growth from the tarsus. In

most of the reported cases the palpebral conjunctiva has presented a normal or nearly normal appearance although the involvement of the tarsus has often been very pronounced.

J. B. LAWFORD.

(4) **Gérard, Georges (Lille).—Ulcerative keratitis of adolescents and adults of hereditary syphilitic origin. (La kératite ulcéreuse de l'adolescent et de l'adulte d'origine hérédo-syphilitique.)** *La Clin. Ophtal.*, February, 1927.

(4) **Gérard's** article is rather too discursive for complete analysis, in so far as he enters at large into the general question of hereditary syphilis. The article is based apparently on the thesis of one of his pupils, Lecomte. It is stated that authors are silent or nearly so on the subject of ulcerative keratitis in hereditary syphilis, and that he, Gérard, considers the condition to be a clinical entity. Gérard deprecates any close investigation into the history of syphilis in the parents as only liable to lead to family trouble. The diagnosis should be made by specific treatment in cases where the usual general and local treatment has been used without success in persistent corneal ulceration. Eight cases have been observed, the ages being 25, 55, 21, 39, 36, 18, 15 and 13 years. There were 7 females and 1 male. The symptoms are serious corneal ulceration, intense photophobia and blepharospasm, pericorneal injection, ocular, orbital and periorbital pain, and lacrimation. There is no tendency to spontaneous cure so long as the aetiology is not recognised. The touchstone is anti-syphilitic treatment which should be intensive: it gives unexpectedly good and rapid results.

ERNEST THOMSON.

(5) **Saltane, Mohazebes (Teheran).—Ulcerative keratitis of hereditary syphilitic origin. (Kératite ulcéreuse d'origine héredo-syphilitique.)** *La Clin. Ophtal.*, April, 1927.

(5) **Saltane** confirms the above observations by Gérard and relates a case.

ERNEST THOMSON.

(6) **Abramowicz, J., and de Mienicki (Wilno, Poland).—The influence of lumbar puncture on retinal arterial pressure in syphilitics. (L'influence de la ponction lombaire sur la pression artérielle rétinienne chez les malades syphilitiques.)** *Arch. d'Ophtal.*, September, 1927.

(6) It is common knowledge that even in its early stages syphilis may give rise to changes in the nervous system. Examining the cerebro-spinal fluid in 844 subjects of secondary syphilis Schon found that meningitis was present in 20 per cent. of untreated

cases. Ravaut states that lymphocytosis is discoverable in 70 to 80 per cent. of cases in the early stage of syphilis. In some instances in which the vascular system is early attacked syphilis gives rise to inflammatory alterations in the cerebral vessels chiefly at the base. These alterations are usually followed by symptoms of cerebral excitation (syphilitic epilepsy) and the lesions in the vascular system may manifest themselves by local vascular hypertonus among other signs. This increase of vascular pressure which usually accompanies rise of intracranial pressure, so frequent among syphilitics, is evidenced also by an increase of pressure in the retinal arteries. Such augmentation of ocular vascular pressure may be one of the first symptoms of syphilitic invasion of the cerebral blood vessels (Bailliart). **Abramowicz** and **de Mienicki** endeavour to demonstrate what is the effect on the retinal arterial pressure of lowering the intracranial pressure by lumbar puncture.

Nineteen lumbar punctures were made in syphilitic subjects, mostly in the secondary stage. The cerebro-spinal pressure was measured by Claude's method. In addition to measurements of the retinal arterial pressure by means of Bailliart's ophthalmo-dynamometer, that of the brachial artery by Korotkoff's apparatus and of the intraocular pressure by Schiötz's tonometer was also taken. Special precautions were observed in order to avoid any inexactitude in the results of these measurements. The lumbar punctures and the measurements of the pressure in the retinal and brachial arteries were made with the patient in a sitting position.

The full results obtained by the authors are given in tabular form: the main facts may be summarised as follows:—

In 10 of the 19 cases retinal arterial pressure fell during the first five minutes after puncture, from 2 to 11 grm., an average of 5.8 grm. In 5 of the 10 cases the fall continued during the succeeding twenty minutes. In 4 of the 19 cases the fall became manifest only at the expiration of ten minutes, and in one instance of thirty minutes. In 3 cases an insignificant rise (2 grm.) was noted during the first five minutes after puncture, but in the first of these a fall to the extent of 8 grm. occurred at the end of thirty minutes. One patient fainted after lumbar puncture; this was accompanied by a marked lowering of the ocular arterial pressure. In 16 out of 18 cases lowering of the pressure occurred during the thirty minutes immediately following the puncture, with an average fall of 8.5 grm. In 12 instances this lowered pressure persisted for several days, especially in one case in which the initial pressure had been unusually high.

The relation of rachidian pressure to ocular arterial pressure appeared to be inconstant; a nearly normal and a slightly raised

ocular pressure were found associated with a high pressure in the spinal canal. In 9 cases a high degree of ocular arterial pressure accompanied a high spinal fluid pressure. A brief bibliography is appended.

J. B. LAWFORD.

(7) **Lacaze, H., and Bidault, R. — Post-traumatic syphilitic interstitial keratitis. The rôle of subconjunctival haemorrhage. (Kératites interstitielles syphilitiques post-traumatiques. Rôle de l'hémorragie sous-conjonctivale.)** *Arch. d'Ophtal.*, February, 1928.

(7) **Lacaze and Bidault** report four cases in which interstitial keratitis with characteristic appearances followed injury to the eye. In all four conclusive evidence of syphilis was forthcoming. The feature common to all four cases and to which the authors call attention, is the occurrence of subconjunctival haemorrhage at the time of the accident. They consider this more than a coincidence. In this connection and in support of their view that the blood extravasation is a contributory factor in the production of the keratitis, they refer to observations of syphilitic arthritis of the knee which follows injury with haemorrhage into the joint. That the effusion of infected blood in the vicinity of the cornea should lead to an invasion of that structure is not at all improbable. The occurrence of subconjunctival haemorrhage in such cases is not essential however; examples of interstitial keratitis in which the exciting cause was a wound or abrasion of the cornea only, are well known.

J. B. LAWFORD.

(8) **Somberg, J. S. (New York).—Optic nerve pallor without functional disturbances in luetics.** *Amer. Jl. of Ophthal.*, November, 1927.

(8) **Somberg's** paper concerns the findings in two thousand cerebro-spinal luetics who showed paretic symptoms. Eighty-six of these showed changes in colour of the disc, varying from slight to almost complete pallor. In 85 per cent. visual acuity was normal, while in the remaining 15 per cent. it was no lower than 20/40. Most of the patients were under observation for two years, during which time the pallor of the discs increased, and in some a slight contraction of the fields became manifest, visual acuity remaining good until quite a late period when it became rapidly diminished, a change from 20/20 to 20/100 occurring in some cases, within two weeks. Pallor of the discs unaccompanied by visual or field changes may thus be the sole prodromal manifestation of future

optic atrophy. The actual figures are as follows:—In 26 per cent. of the cases vision and fields became affected, in 28 per cent. the optic atrophy had been incomplete, while in almost 60 per cent. the fundus picture of primary optic atrophy was present without any marked functional disturbance during a period of two years. The author is inclined to attribute the disc changes to involvement of the small vessels in the central connective tissue strand of the optic nerve.

F. A. WILLIAMSON-NOBLE.

(9) **van Lint (Brussels).—Embolism of a branch of the central artery of the retina after injection of metarsenobenzol. (Embolie d'une branche de l'artère centrale de la rétine après injection de métarsenobenzol.)** *Arch. d'Ophtal.*, July, 1928.

(9) Judging by published records the number of ocular accidents following the treatment of syphilitic disease of the eye by arsenical preparations administered intravenously, is extremely small. In reporting the case occurring under his observation, **van Lint** refers to several examples, only one of which (published by Uhthoff in 1926), is similar in character to his own. This occurred in a man aged 33 in whom the first injection of salvarsan was followed by buzzing in the ears, of four weeks' duration, and the second, by blocking of the inferior temporal branch of the central retinal artery with loss of the upper half of the visual field.

van Lint's patient, a man aged 30, was treated for syphilis by injections of neosalvarsan in 1925, soon after infection. In 1926 he had further treatment by injections of metarsenobenzol. The fifth injection (75 cgr.) was immediately followed by severe headache and tingling in the hands and feet; half an hour later a large portion of the right upper field of vision disappeared. The next day there was noticeable oedema of the retina over the area of distribution of the inferior temporal branch of the central artery, with a corresponding loss in the upper field of vision. The man was free from any cardio-vascular lesion; he had had malaria two years previously.

J. B. LAWFORD.

(10) **Gifford, S. R., and Keegan, J. J. (Omaha, Nebraska).—Results with intracisternal injections in luetic optic atrophy.** *Amer. Jl. of Ophthal.*, May, 1927.

(10) **Gifford** and **Keegan's** paper opens with further particulars about 6 cases treated by this method which were reported in the *Brit. Jl. of Ophthal.*, 1923, Vol. VII, p. 506. They have now been followed for three to five years—one failed gradually in spite of treatment, remaining stationary, however, with vision of 20/200

after three years, one was lost sight of, and the other four remained practically stationary after the course of injections, with useful vision in all cases. The eight cases seen and treated since 1923 were nearly all in the late stage of disease. In five out of the total 14, slight improvement occurred, in one there was marked improvement maintained until death, in five the condition of the better eye remained the same, in four a diminution of vision occurred, in only two did the disease progress so that vision was worse than 19/200 in the better eye, while no case went blind. These results are to be compared with a fair number of cases treated by intensive general and spinal methods, nearly all of whom are practically blind where their fate is known. The authors conclude, therefore, that in their experience cisternal injections have seemed to present distinct advantages over intra-spinal treatment.

F. A. WILLIAMSON-NOBLE.

III.—CORNEA

(1) **Houwer. — Keratitis filamentosa and chronic arthritis. (Keratitis filamentosa und chronische Arthritis.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXX, S. 10, 1928.

(1) **Houwer** reports eleven cases of this somewhat rare disease. He describes it as an interstitial keratitis affecting both eyes, and having a gradual onset, a chronic course, and as being incurable. Filaments are scattered all over the peripheral cornea, especially in the lower segment. These may be either few in number or be well over 100. The disease is accompanied by a viscid secretion in the conjunctival sac. The visual acuity remains fairly good.

The disease usually occurs in women of advanced years. More than half of those afflicted, especially the older cases, are the subjects of rheumatism, or gout. Arthritis deformans, sometimes of a very severe nature, is the most common manifestation. The presence of deformities and nodes of the fingers is the rule, and tophi of the ears are common.

W. S. DUKE-ELDER.

(2) **Stoewer.—The formation of vesicles and cysts on the surface and in the substance of the cornea. (Ueber Bläschen- oder Zysten-bildung in und auf der Hornhaut.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXIX, S. 779, 1928.

(2) **Stoewer** records an interesting case of cyst formation on the cornea. The patient was an old woman with senile cataract.

This was extracted in 1921. The operation was followed by the formation of corneal opacities. In 1922 needling and iridectomy were performed. Total sclerosis of the cornea occurred with keratitis bullosa. After some months a cyst appeared on the centre of the cornea. The anterior wall was removed. Histological examination showed that this was composed of normal corneal epithelium covering a membrane resembling the lamellae of the cornea in structure.

W. S. DUKE-ELDER.

(3) **Blaauw, E. E. (Buffalo, N.Y.).—Birth trauma to the cornea.** *Amer. Jl. of Ophthal.*, June, 1928.

(3) **Blaauw's** paper gives a short review of the literature on this subject and describes a case of his own, of which the pertinent details are as follows. There was some difficulty at birth and forceps had to be used. Ten days later the left cornea was found to be opaque, and six months later there was still some haze in its central portion, later still, some fine hair-like lines were noted in the anterior chamber. At the age of 18, the eye presented a band passing obliquely across the cornea from 10 o'clock to 4 o'clock, and about 3 mm. wide, with some fine hair-like bands in the periphery. The slit-lamp showed that these were attached to the posterior corneal surface, their free ends floating in the aqueous. Their presence was thought to be due to an extensive rupture of Descemet's membrane having occurred at birth.

F. A. WILLIAMSON NOBLE.

(4) **Denig, Rudolf (New York).—Transplantation of mucous membrane from the mouth in various diseases of the cornea, and burns of the eye. (Transplantation von Mundschleimhaut bei verschiedenen Erkrankungen der Hornhaut und bei Verbrennungen und Verätzungen des Auges.** *Arch. f. Ophthal.*, Bd. CXVIII, 1927.

(4) **Denig** has already published work on the transplantation of oral mucous membrane in various diseases of the cornea and here records further experiences of his operation as a curative measure.

He first employed this form of graft in cases of trachomatous pannus, and explains the success attending it by the fact that such a flap better isolates the pannus from the trachomatous conjunctiva, than simple excision of a strip of conjunctiva, by its hyperaemic action improves the nutrition of the cornea, and forms a kind of protection to the cornea from the weight and rubbing of the upper lid. In these cases complications, such as trichiasis or degenerated tarsus, were first dealt with. In obstinate

cases that have resisted all other forms of treatment, he has obtained successful results, the great majority of his pannus cases being cured by a single transplantation. He has also used it with success in cases of tuberculous sclero-keratitis, obstinate scrofulous pannus, herpes and dystrophy of the cornea, and sluggish processes of the cornea of obscure aetiology.

For burns of the eye he urges immediate transplantation as the only proper method of treatment where the cornea is involved however slightly, or, in the absence of a corneal lesion, the conjunctiva is severely affected.

The technique of the operation is shortly as follows:—

The conjunctiva with the subconjunctival tissue along the extent of the corneal lesion, or if necessary, all round the cornea, is separated close to the limbus, and a strip of it 6-8 mm. wide excised. With the aid of a scalpel all tissue is scraped off the limbus and sclera over this area, and in the case of pannus it also is gently scraped. The eye is then closed and covered with a moist swab, while a suitable flap of mucous membrane from the mouth is prepared and freed from fat, capillaries, or submucous tissue if necessary (in pannus cases the flap is cut fairly thick). This flap is then placed on the conjunctival defect and sutured to the remaining bulbar conjunctiva by means of silk sutures. The graft must lie smoothly over the defect. The corneal edge of the flap is then trimmed with bent scissors so that it will just cover the limbus. Both eyes are bandaged for five days; the bandage is changed daily and the secretion removed without opening either eye. The author formerly used atropine daily in cases of burns but has now given it up as unnecessary. The patient may be discharged on the seventh day, and the stitches are removed 10-14 days after the operation.

In cases of trachomatous pannus where both eyes are affected he recommends that the operation should be carried out on both eyes at one sitting.

THOS. SNOWBALL.

(5) **Meyer, Guido (Zürich).—The initial stages of development of gerontoxon. (Die Anfange des Gerontoxon.)** *Arch. f. Ophthal.*, Bd. CXIX, Pt. i, 1927.

(5) The earliest sign of gerontoxon, which **Meyer** studied in a large number of cases by means of the slit-lamp, consists of an opacity at the periphery of Descemet's membrane which extends under the limbus to the angle of the anterior chamber. It was found among the patients he examined as early as in the second decade of life in the lower and lateral parts of the cornea, but never at the upper margin. In the second stage there appears in the

fourth decade, or often later, an opacity in the peripheral part of Bowman's membrane, which in contrast with that in Descemet's layer leaves a clear zone between its sharply defined peripheral margin and the limbus. This superficial opacity may make its first appearance in any sector of the corneal margin, and forms the initial change at the upper periphery of the cornea.

The opacity in these two membranes, especially the superficial, gradually extends into the central corneal layers until it involves the whole thickness of the cornea; this fusion of the two opaque layers occurs more readily and more rapidly at the upper limbus. The opacities usually progress equally in both eyes and may gradually attain such a size and density as to become visible to the naked eye as the well-known arcus senilis.

THOS. SNOWBALL.

(6) **Krautbauer.—Tattooing of the cornea by a chemical method with silver nitrate, gold chloride, and platinum chloride. (Beiträge zur Tätowage der Hornhaut auf chemischen Wege mit Silbernitrat Goldchlorid sowie mit Platinchlorid.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXX, S. 66, 1928.

(6) **Krautbauer** has made a contribution to the already large literature on the subject of tattooing. He performed experimental studies on rabbits, using silver nitrate, gold chloride, and platinum chloride, with hydrazin hydrate as a reducing agent. He finds that on reduction with hydrazin hydrate solutions of silver nitrate turn a dark sienna colour, which is evenly distributed throughout the epithelial cells without causing any observable damage. Gold chloride on reduction with hydrazin hydrate produces an intense black tattooing with a metallic lustre. With hydrazin hydrate finely divided platinum is deposited on the cornea from weak solutions of platinum chloride. The author is of the opinion that hydrazin hydrate is a material advantage to these procedures, produces no injurious effects and makes the age of the solution employed of no importance in the final results.

W. S. DUKE-ELDER.

BOOK NOTICES

Myopia: London County Council. Annual Report of the Council, Public Health. Vol. III. 1927.

No one now expects that the introduction of "scientific" desks will abolish myopia, and even text-books do not consider it necessary to illustrate those terrible face-rests which aimed at preventing too close an approach to the work. It is therefore all the more interesting to see that the London County Council is now experimenting with tables and chairs instead of desks. There seems to be a revolt against desks altogether which is gradually gathering head. Whether this represents progress or merely another swing of the pendulum remains to be seen.

During the year 1927 no fewer than 28,726 children were prescribed glasses under the Council's scheme for treatment; the magnitude of these figures illustrates the extent to which the school medical service of the Council is operative. It would appear that, in the opinion of the Council, the myopia schools have vindicated their existence to such an extent that it was felt advisable to arrange special classes in secondary schools where the special regulations for the care of myopes can be observed.

A most interesting feature of the report is the work of Dr. Elizabeth McVail on the progress of myopia in pupils who had attended myopia classes for over three years. Out of 104 children investigated, 27 showed a definite family history in the sense that either one of the parents was myopic or that a brother or sister had attended or was still attending at a myopic school. A peculiar feature was that in some families (though not in all) myopic children tended to be closely associated as regards their numerical position in the family. A genetic factor operating in such families is suggested. A striking result is obtained in her analysis of the physical condition of these 104 myopic children. It appears that the percentage of under-nourished children is about two and a half times as great amongst them as compared with the ordinary school population; and, furthermore, while the condition of the teeth differs but little from that of normal children, infected tonsils seem to have been present or were present at the time of examination in about 50 per cent. of the myopes. This represents an incidence probably four or five times as great as that occurring in non-myopic children. The importance of septic tonsils in progressive myopia is also seen from the fact that in this series more cases with marked progression yielded a definitely higher percentage of cases where tonsillectomy was indicated. "In 68 per cent. of cases tonsils and adenoids were

a factor possibly operative in the increase of myopia during the period spent at the sight-saving classes."

No one who has considered the subject will need convincing that myopia does not represent an exaggeration of the normal growth of the eye. The development of the myopic eye is such a vastly different thing from the almost stationary nature of the hypermetropic eye that it is quite probable that the onset of myopia and its progression represents a definite pathological process. How far that process may be regarded as an expression of focal sepsis is a problem well worth consideration. Incidentally such a view holds out some hope of controlling an affection that is almost as elusive to-day as it was fifty years ago.

Die Lichtbehandlung in der Augenheilkunde. By PROFESSOR DR. A. BIRCH-HIRSCHFELD and PRIV.-DOZ. DR. W. HOFFMANN. Pp. 112, 34 illustrations. Berlin and Vienna: Urban and Schwarzenberg. 1928. Price 12 marks.

The pioneer work of Birch-Hirschfeld in the experimental investigation of the effect of radiant energy of all kinds upon the eye and the therapeutic application of these experimental results in ophthalmological diseases is well known. Of recent years at his clinic at Königsberg treatment by ultra-violet light has become a routine in many diseases, and it is a matter of congratulation that, in association with his assistant, Dr. Hoffmann, he has gathered the results of his experience into a small monograph. The first few chapters are devoted to a rapid summary of our knowledge of physics and the physiological, biological and pathological action of light, the technique to be employed in radiation, and the applicability of light treatment in ophthalmic diseases. The book is almost wholly concerned with the application of light to the eye locally, and prominence is given to the author's own type of lamp where the source of light is a carbon arc. The clinical applications of such treatment are largely limited to the outer structures of the eye, but in these extremely good results can be obtained. The list of diseases which can be treated with benefit are: those of the lids—eczema, blepharitis, lupus; of the conjunctiva—conjunctivitis, tuberculous conjunctivitis, trachoma; and of the cornea—herpes, phlyctenular disease, marginal ulcer, ulcus serpens, and most other types of ulcer, pannus, deep keratitis; of the sclerotic—episcleritis; while its employment is suggested in infected wounds of the cornea and sclerotic, and to help to alleviate corneal scars. The disease which has been found to respond to local radiation most satisfactorily is (pneumococcal) hypopyon ulcer: the statistics of the clinic show that up to 1924, 281 such cases were treated, of which 189 were severe, 72 were of moderate severity, while 20 were mild. Of these

only 24 cases progressed to excision, 22 of the first group, and 2 of the second, a percentage of 8.5. In a later series (1927) of 190 cases, the percentage of excised eyes was reduced to 4.6. These results would seem to justify the authors' claim that radiation is the treatment of choice in such cases. The book is an important exposition of a relatively new and little known branch of ophthalmological therapeutics, and is valuable, not only because of the authoritative information which it contains, but also for the lack of bias in the opinions which it expresses.

CORRESPONDENCE

A CASE OF FUNCTIONAL BLINDNESS

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIR,—I shall feel much obliged if you will kindly give some space in your valued journal to the following case which I am sure would be of great interest to the medical practitioner in general and the ophthalmologist in particular.

On April 6, 1928, when I was working in my consulting room, I got a telephone message to the effect that a young man soon after coming from the church got suddenly blind and that I should see him immediately. I asked his relatives to bring him to the office and within half an hour he was there.

He is a clerk, of healthy appearance, and 26 years of age.

Family history:—Father alive, aged 51 years. Mother died of heart failure when the patient was 2 years old. No brothers. One sister from stepmother, 14 years old and healthy.

Habits:—Fairly active, smokes 25 cigarettes a day, a teetotaller, eats meat in fair quantities and is fond of reading a lot particularly at night.

Physical examination:—The patient when he entered my room was brought by the aid of two individuals and was completely blind. He had not even perception of light as he failed to appreciate a strong electric light which was in front of him. On examination nothing abnormal was found on inspecting the anterior parts of the eyes, and the fundus, as far as could be seen with the undilated pupil, was normal.

I put in half per cent. of atropine before making another examination and engaged him in conversation and found tremors of

lips and of fingers. From his replies to questions he seemed a man of emotional nature. I made another darkroom examination and again failed to find anything abnormal there. I made up my mind as to diagnosis (*i.e.*, functional blindness). To make sure, I called him again next morning and prescribed in the meantime a blue pill to be taken at night and followed up by mag. sulph. in the morning. He went back with his relatives to the chemist to get the medicine. On the way the young man had a violent sneeze and immediately recovered his sight. Next morning he entered my room unaided, which confirmed my diagnosis of functional blindness. To make matters doubly sure, I sent him to a well-known physician for examination. The physician did not find anything organically wrong with him except that he had a few bad teeth which required looking after. All his organs were sound and healthy. Urine, normal. Reflexes, exaggerated. I think, it would be well if I here quote the physician's own sentence. "He (the patient) has told me all his history and I conclude that he is a case of hysteria.

The treatment needs no special comment."

During my practice of 20 years, this is the first case of its kind that I have seen.

Yours truly,

S. P. SHROFF.

P.S.—Field of vision in both eyes slightly contracted concentrically.

DELHI.

April 13, 1928.

THE TREATMENT OF HYPOPYON ULCER

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

SIR,—Since reading the various plans of treatment for hypopyon ulcer, I would like to state my method of dealing with such cases.

Following upon the introduction of the colloidal compounds of mercury and silver (Crookes), I have practically used no other remedies in the past eight to ten years. I practically never use cautery or carbolic acid. As soon as a case is recognised—and the earlier the better—it is admitted to hospital, if a poor patient, and treatment with colloidal mercury is started.

Now it is useless to instil it three or four times a day. What is

done is to instil it every hour, or if a very bad case, every half-hour, day and night, for the first 24 hours. The nurse is given definite instructions what to do. A stream of 10-20 drops is put well into the conjunctiva. The nurse waits one minute, timing herself, and the instillation is repeated, and again repeated, three instillations being given. In this way full effect of the drops is obtained. The patient must be wakened up to have the drops: this is essential.

The next 24 hours it is instilled about every 1½ hours, and the third day every two hours. This rarely fails to check the spread of the ulcer.

Atropine is used once or twice daily to control iritis, and the patient invariably expresses relief from pain and irritation.

If there is a dirty tear sac, the lower canaliculus must be slit well up into the sac, as the late Dr. Argyll Robertson used to do, and the sac frequently pressed out, and the discharge washed away with collosol hydrarg. In my opinion the results are remarkable. In proof of this I may quote the following. A successful cataract operation at the end of 10 days developed a septic ulcer in the site of the incision with pus dropping down into the anterior chamber, causing me great alarm. The above plan of treatment checked it entirely. A month ago a workman developed a bad septic ulcer on the lower half of the cornea. Collosol hydrarg checked it entirely and healed it.

The great advantage of this plan of treatment is that it is simple and painless, and douching with large quantities of lotion not necessary. At the end of a few days the colloidal mercury begins to irritate, then colloidal silver can be used or a simple lotion. The colloidal preparations must be fresh and not have been exposed to bright light for a long period.

In all cases the condition of the tear sac must be noted, also the condition of the nose and mouth. A dirty mouth, bad teeth, pyorrhoea, accumulations of tartar, etc., are a frequent cause of eye disease and some infections of the eye.

I have tried compound colourings but have not found them satisfactory. Compound colourings consist of scarlet red, methylene blue, gentian violet made up in the form of an ointment. It is successful in a number of cases, but one of the difficulties is to get it well retained in the eye between the lids.

In my opinion no plan of treatment equals the very frequent application of fresh colloidal mercury to the ulcer.

Yours truly,

G. VICTOR MILLER

STOCKTON-ON-TEES.

OBITUARY

Mr. W. M. BEAUMONT

WE regret to record the sudden death on October 18, of Mr. W. M. BEAUMONT, of Bath. He was at work in his consulting room, seeing a patient, at the time.

William Mardon Beaumont was born in 1851. He was educated at Aberdeen and at the Middlesex Hospital, where he was house-surgeon to Mr. J. W. Hulke. He had taken the usual double qualification of an earlier day, namely the L.S.A. in 1874, and the M.R.C.S. in the next year. Settling in Bath he devoted himself to ophthalmology, and was Hon. Surgeon to the Bath Eye Infirmary from 1888 to 1908. He joined the Ophthalmological Society of the United Kingdom forty years ago, and at one time acted as one of its Vice-Presidents.

Beaumont was an active member of the ophthalmic section of the British Medical Association; thus, he was Secretary of the section at the Carlisle meeting in 1896, a Vice-President at the Leicester meeting in 1905; and when, three years ago, the Association held its annual meeting at Bath, he was President of the section, a fitting tribute to his position as the senior ophthalmic surgeon practising in the city of his adoption.

He contributed papers on subjects of ophthalmic interest to the various journals; wrote a good deal on the subject of malingering in eye cases, and was the author of a small book on industrial eye injuries and the Workmen's Compensation Act which was published in 1907.

Apart from his work, he was a keen collector of furniture and pottery, and was fond of antiquarian pursuits.

NOTE

Death

WE regret to have to record the recent death of Sir Hugh Anderson, Master of Gonville and Caius College, Cambridge, who was the first to demonstrate beyond dispute, by physiological means, the existence of a dilatator iridi-

FUTURE ARRANGEMENTS

1928

December 7.—North of England Ophthalmological Society, at Leeds.

December 14.—Section of Ophthalmology, Royal Society of Medicine. (Clinical Meeting).

1929

January 11.—Section of Ophthalmology, Royal Society of Medicine.

February 1.—North of England Ophthalmological Society, at Liverpool.

February 8.—Section of Ophthalmology, Royal Society of Medicine.

March 1.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

March 8.—Section of Ophthalmology, Royal Society of Medicine. (Clinical Meeting).

March 22.—North of England Ophthalmological Society, at Sheffield.

June 14.—Section of Ophthalmology, Royal Society of Medicine. (Annual Meeting).

September .—International Congress of Ophthalmology at Amsterdam.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *October, 1928.*

BARKAN, OTTO and HANS. Fracture of the optic canal.
CORBETT, J. J. Plastic dacryorhinostomy.
SCARLETT, HUNTER W. Ptosis operation according to the Shoemaker method.
WILDE, A. Congenital absence of abduction.
VAIL, DERRICK T., Jr. Argyrosis of the tarsal conjunctiva in an infant.
BLACK, N. M., and HAESSLER, F. HERBERT. Pigmented lesions of the conjunctiva.
PISCHEL, KASPAR. Glaucoma, an historical review.
ALLEN, KENNETH D. A. X-ray therapy as a diagnostic agent in orbital tumors.
CRISP, WILLIAM H. The literary phase of ophthalmology.

The Journal of Ophthalmology, Otology and Laryngology. *August, 1928.*

THOMPSON, LE ROY. Industrial ophthalmology.

September, 1928.

WARNER, CARDEN F. Hyperplastic sphenoiditis and its clinical relation to the eye.
BOWMAN, STUART H. Report of a case of ethmoiditis with orbital complications.
PAGANELLI, T, R. Pseudo-glioma in a child of five weeks.

Annales d'Oculistique. *September, 1928.*

REDSLOB and REISS. Contribution to the study of swelling of the vitreous. The rôle of pH.
AMSLER and DUBOIS. Ophthalmoscopic topography and retinal detachment.
SOBHY BEY. Palpebro-conjunctival bilharziosis.

October, 1928.

DIAZ-CANEJA. On binocular alternation.
WINCKLER PRINS. Study of the bands of illumination of the cornea and of the deposit of gold in scars.
DE ST. MARTIN. Adrenalin mydriasis in the operation for cataract.
ZAMENHOFF and PLONSKIER. Metastatic adeno-carcinoma of the choroid.
COSMETTATOS. On the genesis of congenital hydrophthalmos.

Archives d'Ophtalmologie. *September, 1928.*

WEEKERS and MISSOTTEN. Does amaurosis gravidarum, wrongly named uraemic amaurosis, necessitate termination of pregnancy?
GONIN. My most recent experience in retinal detachment.
DEJEAN. Pseudo-ossification of the vitreous and proliferating osteogenetic cyclo-choroiditis.
BISTIS. Experimental and clinical study of the rôle of the sympathetic in the aetiology of heterochromia.

October, 1928.

COPPEZ. On chalky deposits in the eye.
TRANTAS. On gonioscopy.
WEEKERS. A proposal concerning the physical fitness of motor drivers.
JEANDELIZE. On the necessary visual acuity of motorists.

La Clinique Ophtalmologique. *July, 1928.*

MONBRUN. Cure of trachoma by surgical diathermy.
DOMEC. Milk in therapeutics.
NATTAF. History of vaccine therapy in general, with special reference to gono-coccal ophthalmia.

Archiv für Ophthalmologie. *October, 1928.*

SERR. On the question of the causal relation between pupillary diameter and intra-ocular tension.
BODENHEIMER and KORBSCH. Clinical and anatomical observations on the theory of pupillary fibres.
BÜCKLERS. Experimental and histological investigation of the influence of highly concentrated ultra-violet light on the rabbit's eye.
OHM. On nystagmus.
SAFAR. On the appearance of rings in the iris, due to its wrinkling in conditions of marked softening of the eye.
MAGNUS. Dacryops with anophthalmos.
JAENSCH. Paresis of the superior rectus.
HEDINGER. Mariotte's spot in axial myopia.
GAISER. The double refracting lens.
CORDS. After images of movement.
KESTENBAUM and EIDELBERG. Convergence reaction of the pupil and accommodation.
LEIRI. Is there an extra-lenticular accommodation mechanism?
MAGNUS. Radiography of pituitary tumours with notes on the hemianopic pupil.
KUMER and SALLMANN. On iris discoloration after radium.

Klinische Monatsblätter für Augenheilkunde. *October, 1928.*

MARX, MENDES DA COSTA-VET, NAAR, AND WOLFF. New method of using cocaine in ophthalmology.
MEYERBACH. Corodenine as a protective of the eye from ultra-violet light.
UYEMURA. On a noteworthy fundus change in two cases of idiopathic hemeralopia.
WEIHMANN. Natural size photography of the eye.
VAJDA. The avoidance of the sequelae of eye injuries, with reference to the workman's insurance.
TABORISKY. On the aetiology of epitarsus.
KOYANAGI. Further observations on the occurrence of cupped disc in non-glaucomatous eyes.

Zeitschrift für Augenheilkunde. *October, 1928.*

LIEBERMANN. On muscle lengthening.
UTERMANN. On statistics of blindness in large towns.
MORETTI. On appearance of bone inside a glaucoma cup.
KREUTZFELDT. Notes on hypopyon iritis.
GLASSCHIEB. On the pathogenesis and clinical course of retro-bulbar neuritis.

Annali di Ottalmologia e Clinica Oculistica. *October, 1928.*

OVIO. Formulae and tables of incapacity from ocular injuries.
MIHELATTI. The normal pressure of the cerebro-spinal fluid.
LUPPINO. Cavernous angioma of the orbit.
ANTONIBON. Modification of the lash follicles after electrolysis.
GIANNANTONI. Researches into the chemical composition of the blood in cataract patients.

Archivio di Ottalmologia. *August, 1928.*

GUERRA. A case of cavernous sinus thrombosis from sphenoidal sinusitis.
SGROSSO. Trachoma, follicular conjunctivitis and conjunctival tubercle, a histo-pathological study.

Bolletino d'Oculistica. *August, 1928.*

SERRA. Tumours of the caruncle.
FEDERICI. On the histology of conjunctival flaps in perforating wounds of the cornea,
ALIQUÒ-MAZZEI. Histological study of the glandular formations in the wall of the lacrimal sac.
BENCINI. On a rare form of palpebral tubercle.

September, 1928.

CAVARA. On a case of sub-chronic uveal parotid fever of Heerfordt.
VERZALLA. Clinical contribution to the study of neoplasms of the orbit.
COSENZA. Considerations on three cases of pathological cranio-stenosis.
MAESTRO. On a perfected method of intra-capsular extraction of senile cataract.

Archivos di Oftalmologia. *October, 1928.*

RIBAS, VALERO. On ocular dynamics.

Revista Oto-Neuro-Oftalmologica y de Cirurgia Neurologica.

VASQUEZ BARRIERE. Intra-ocular and meningeal haemorrhages.
LLAMBIAS. Histogenesis and classification of tumours of nerve tissue.
ERRECART. Nystagmus from pneumatic reactions and Babinski's electric test.
MINGAZZINI. The architecture of Lenin's cerebral hemispheres.
RICALDONI. Syndrome of the external wall of the cavernous sinus of probable syphilitic origin.